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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/044,732	01/11/2002	Franklin Dean Kalk	064441.0225	1593

31625 7590 08/21/2003

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PATENT DEPARTMENT
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AUSTIN, TX 78701-4039

EXAMINER

ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
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1756

DATE MAILED: 08/21/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,732

Applicant(s)

KALK, FRANKLIN DEAN

Examiner

Stephen Rosasco

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1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Detailed Action

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1- are rejected under 35 U.S.C. 103(a) as being unpatentable over Kemp et al. (5292,623) in view of Hur et al. (5,437,947) or Vasudev et al. (5,411,824).

The claimed invention is directed to an alternating aperture phase shifting mask and a method of making said mask, comprising forming grooves in a transparent substrate and forming an antireflective layer in the bottom of the trench. Then depositing an opaque layer on the substrate.

Kemp et al. teach a phase shifting mask comprising the formation of a trench in the substrate to form the phase shifter. And wherein the depth of trench region is customized to the degree of phase shifting that is desired, and to the exposure wavelength of the optical imaging source which will be used in conjunction with the phase shifting mask to define integrated circuit patterns on a semiconductor substrate.

Kemp et al. also teach that the chrome oxide that lies on the top surface of the chrome serves as an anti-reflective coating and is essential for high resolution optical lithography because it minimizes the back reflection of light from the mask.

The teachings of Kemp et al. differ from those of the applicant in that the applicant teaches that the antireflective layer is formed in the bottom of the trench, and that it is formed of magnesium fluoride.

Hur et al. teach a phase shifting mask comprising: a transparent substrate having at least one or more trenches spaced apart from each other by a predetermined distance; an opaque layer filling some portion of the trench; and a phase shifting layer formed on the substrate area between the trenches.

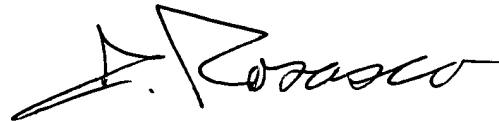
Vasudev et al. a photolithography mask having phase shifting regions disposed thereon for phase shifting incident light transmission therethrough such that a phase difference occurs between light traversing through said phase shifting regions as compared to other regions of said mask, said other regions being defined as nonshifting regions, comprising: a substrate having vertical trenches formed therein, wherein said trenches function as said phase shifting regions, said trenches having vertical sidewalls which delineate a separation between said phase shifting and nonshifting regions; conductive regions being formed along sidewalls of said vertical trenches for absorbing or attenuating light energy impinging on said sidewalls; wherein said conductive regions inhibit scattering of light within said phase shifting regions in order to improve resolution of a projected image field.

It would have been obvious to one having ordinary skill in the art to take the teachings of Kemp et al. and combine them with the teachings of Hur et al. or Vasudev et al. in order to make the claimed invention because it would be obvious to substitute the antireflective material for opaque material in the trenches because in both cases the material is being used for the same known purpose which is to remove the backscattered light from affecting the exposure by either absorption with an opaque layer or transmission through the substrate with an antireflective layer, and the use of magnesium fluoride as an antireflective layer in the photomask art is well known.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to S. Rosasco whose telephone number is (703) 308-4402.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0661. Fax (703) 872-9310 Before Finals; 872-9311 After Finals.

A handwritten signature in black ink, appearing to read 'S. Rosasco', with a stylized, sweeping flourish at the end.

S. Rosasco
Primary Examiner
Art Unit 1756

S. Rosasco
8/14/03